

COMNAB11ND/JAM:pl

Serial: 95
671

JUN 16 1958

SPECIAL HANDLING REQUIRED IN ACCORDANCE WITH OPNAVINST
3750.6B PART VII

THIRD ENDORSEMENT on NAF, China Lake, AAR #3-58, concerning
F4D-1, BuNo 134762, pilot (b) (6)

From: Commander, Naval Air Bases, Eleventh Naval District
To: Chief of Naval Operations (OP-57)
Via: (1) Chief, Bureau of Aeronautics (Aer-512)
(2) Commander, U. S. Naval Aviation Safety Center
Subj: AAR #3-58 concerning F4D-1, BuNo 134762; forwarding of

1. Forwarded.

G. B. H. Hall

G. B. H. HALL

Copy to:
BUAER (Aer-512) Direct
COMNAVAVSAFCEN (2) Direct Air Mail
BAR El Segundo
CO NAF China Lake
COMNOTS China Lake
BUARD

SPECIAL HANDLING REQUIRED IN ACCORDANCE WITH OPNAV INST. 3750.6B PART VII

1424/JMW:edc
Serial 2465

10 JUN 1958

SECOND ENDORSEMENT on NAP, China Lake AAR 3-58, concerning F4D-1 BuNo
134762, Pilot LCDR (b) (6) USN

From: Commander, U. S. Naval Ordnance Test Station
China Lake, California
To: Chief of Naval Operations (OP-57)
Via: (1) Commander, Naval Air Bases ELEVENTH/TWELFTH Naval Districts
(2) Chief, Bureau of Aeronautics (Aer-512)
(3) Director, Naval Aviation Safety Center

1. Forwarded, concurring in the conclusions and recommendations of the Aircraft Accident Board, and in the comments contained in the first endorsement.
2. The pilot's fear of suffocation due to possible blocking of the oxygen mask hose inlet in the event of unconsciousness, and his resultant decision to remove the mask and accept the risk of losing his helmet are considered worthy of note. It is recommended that the Naval Aviation Safety Center review the history of similar occurrences, and, if this apprehension is found to be prevalent and well-founded, formulate and publish recommended procedures to be followed pending possible redesign of the hose assembly.

W. W. Hollister

W. W. HOLLISTER

Copy to:
Naval Aviation Safety Center (2-Air Mail)
BuAer (Aer-512)
BAR El Segundo
BuOrd

ORIGINAL

SPECIAL HANDLING REQUIRED IN ACCORDANCE WITH OPNAV INST. 3750.6B PART VII

U. S. NAVAL AIR FACILITY
China Lake, California

182/GWD:dar
A25
Serial 286
27 May, 1958

FIRST ENDORSEMENT on NAF- China Lake AAR 3-58, concerning F4D-1 BuNo 134762,
Pilot LCDR (b) (6) USN

From: Commanding Officer, U. S. Naval Air Facility, China Lake, California
To: Chief of Naval Operations (OP-57)
Via: (1) Commander, Naval Ordnance Test Station, China Lake, California
 (2) Commander, Naval Air Bases ELEVENTH/TWELFTH Naval Districts
 (3) Chief, Bureau of Aeronautics (Aer 512)
 (4) Director, Naval Aviation Safety Center

1. Forwarded, concurring in the conclusions and recommendations of the Aircraft Accident Board.
2. Revised F4D maintenance inspection procedures have been initiated in an attempt to detect control system trouble before actual failure occurs. However, it is recognized that re-design of the affected parts is the only satisfactory solution to this problem, and speedy action is therefore urged.
3. The failure of four parachute shroud lines during what appears to have been a moderate speed ejection is a matter of grave concern. The resulting rapid rate of descent leaves little doubt that the pilot was extremely fortunate to have escaped much more severe injury.
4. Douglas Aircraft Corporation is studying the circumstances surrounding this accident. Should their report contain any new information, it will be forwarded when received.

G. J. Anderson
G. J. ANDERSON

3

Copy to:
Naval Aviation Safety Center (2-Air Mail)
BuAer (AER-512)
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PART I - GENERAL

1. AIRCRAFT ACCIDENT BOARD CONVENED BY:	2. DATE OF ACCIDENT	TIME	3. AAM SERIAL NO.
U. S. Naval Air Facility, China Lake, Calif.	5/14/58	1313U	3-58
4. TO:	5. ENCLOSURES: (1) Pilot's Statement (2) Eyewitness' Statement		
CHIEF OF NAVAL OPERATIONS (Op-57)	(3) Maintenance Officer's Statement		
6. VIA: (1) Commander, Naval Ordnance Test Station	(4) Aerological Summary		
(2) Commandant, ELEVENTH Naval District	(5) Survival Officer's Statement		
(3) Chief, Bureau of Aeronautics (Aer-512)	(6) Diagram of Crash		
(4) Director, U.S. Naval Aviation Safety Cen.	(7) Photo of Crash Scene		
(5)	(8) Photo of starboard wing		
(6)	(9) Photo of port wing center sect.		
(LAST) DIRECTOR, U. S. NAV. AV. SAFETY CENTER	(10) Photo of starboard wing		
7. REPORTING CUSTODIAN (if different than Item number 1)	(11) Photo of port wing center sect.		
	8. ACTIVITY OPERATING AIRCRAFT (if different than item 7)		

9. KIND OF FLY.	10. TIME OF DAY	11. LOCATION OF ACCIDENT	12. ELEV. ABOVE SEA LEVEL
104	<input type="checkbox"/> DAWN <input checked="" type="checkbox"/> DAY <input type="checkbox"/> DUSK <input type="checkbox"/> NIGHT	NOTS North Bombing Range	3000'

13. PLACE OF LAST TAKE-OFF	14. CLEARED
NAF, China Lake	FROM NID TO: NID

15. TYPE CLEARANCE:	<input type="checkbox"/> IFR <input type="checkbox"/> VFR <input checked="" type="checkbox"/> LOCAL <input type="checkbox"/> OPERATIONAL <input type="checkbox"/> AIRWAYS <input type="checkbox"/> DIRECT <input type="checkbox"/> OTHER, SPECIFY
---------------------	---

16. TIME IN PLT.	17. TYPE ACCIDENT	18. PHASE OF FLIGHT
0.1	G-1	5

19. MODEL	20. SERIAL NO.	21. DAMAGE TO AIRCRAFT	22. POL. COST 23. AIRSPEED (ft/sec) 24. A/C WT.
FAD-1	134762	<input checked="" type="checkbox"/> A. <input type="checkbox"/> B. <input type="checkbox"/> C. <input type="checkbox"/> D.	\$631,870.00 Undetermined 23,667# (Incl. Instrumentation)

25. LIST MODEL, SER. NRS, REPORTING CUSTODIAN AND DAMAGE CLASSIFICATION OF ANY OTHER A/C INVOLVED (complete separate OPNAV Form 3750-1 for each A/C) None

1. PERSONNEL	2. NAME (last, first and middle initial)	3. RANK RATE	4. VICE S. DESIG.	5. DATE DESIG.	6. DATE OF BIRTH	7. DATE OF AGE
PILOT/PERSONNEL IN CONTROL AT TIME OF ACCIDENT	(b) (6)	LCDR	(b) (6)	1312	6/27/45	(b) (6) 37

CO-PILOT	9. OPERATIONAL FLT. TRAINER	10. UNIT TO WHICH ATTACHED	11. TYPE INSTRUMENT CARD
	<input type="checkbox"/> AVAILABLE <input checked="" type="checkbox"/> USED		<input type="checkbox"/> STANDARD <input checked="" type="checkbox"/> SPECIAL

PILOT	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	NAF, China Lake, Calif.	<input type="checkbox"/> STANDARD <input checked="" type="checkbox"/> SPECIAL
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CO-PILOT	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		<input type="checkbox"/> STANDARD <input checked="" type="checkbox"/> SPECIAL
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ITEM	PILOT	CO-PILOT	STO.	ITEM	PILOT	CO-PILOT	STO.
------	-------	----------	------	------	-------	----------	------

ALL MODELS	2882.3	214.3	427.8	CV LANDINGS DAY/NIGHT	0	0	0
------------	--------	-------	-------	-----------------------	---	---	---

ALL MODELS IN LAST 12 MOS.	239.6	82.2		FCLP LANDINGS DAY/NIGHT	0	0	0
----------------------------	-------	------	--	-------------------------	---	---	---

ALL MODELS IN LAST 3 MOS.	62.8	12.5		INSTRUMENT HOURS, LAST 3 MONTHS	4.4	0	0
---------------------------	------	------	--	---------------------------------	-----	---	---

ALL SERIES THIS MODEL	32.8			NIGHT HOURS, LAST 3 MOS.	2.3	0	0
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ALL SERIES THIS MODEL, LAST 12 MONTHS	23.7			(jet accidents only) TOTAL JET PILOT HOURS	604.8		
---------------------------------------	------	--	--	---	-------	--	--

ALL SERIES THIS MODEL, LAST 3 MONTHS	4.5			DATE LAST FLIGHT, ALL SERIES THIS MODEL	4/30/58	12	
--------------------------------------	-----	--	--	---	---------	----	--

NAME (last, first and middle initial)	GRADE	SERVICE NO.	ORG. TO WHICH ATTACHED	INSTR. GILLET FOR
(b) (6)	LCDR	(b) (6)	NAF, China Lake	D Pilot PAF

5.	6.	7.	8.	9.
----	----	----	----	----

10.	11.	12.	13.	14.
-----	-----	-----	-----	-----

(If additional space is necessary, attach additional sheet(s))

AIRCRAFT ACCIDENT REPORT

1. CEILING Unlimited	2. VISIBILITY Unrestricted	3. WIND DIRECTION 090°	4. TEMPER- ATURE 33°F	OUTSIDE RUNWAY DEW POINT 192°F	6. ALTIMETER 31°F
					7. OTHER WEATHER CONDITIONS (winds aloft, icing levels, state of sea, etc., if pertinent to accident)

None

SECTION E - PRIMARY FACTORS ACCIDENT	ITEM	P/S	ITEM	P/S	ITEM	P/S
	PILOT ERROR		LANDING SIGNAL OFFICER ERROR		MATERIAL FAILURE OR MALFUNCTION	<input checked="" type="checkbox"/>
CREW ERROR	<input checked="" type="checkbox"/>	OTHER PERSONNEL ERROR, Specify _____		MATERIAL INADEQUACY	<input checked="" type="checkbox"/>	
SUPERVISORY PERSONNEL ERROR		ADMINISTRATIVE ERROR		ROLLING AND PITCHING DECK/ROUGH SEAS		
MAINTENANCE PERSONNEL ERROR		AIRPORT OR CARRIER FACILITIES		UNDETERMINED		
SERVICING PERSONNEL ERROR		WEATHER		OTHER: Specify _____		
FOR ACCIDENTS ABOARD DEPLOYED CARRIERS (Complete following Section on Pilot)						
1. DATE DEPLOYED		2. DAY-HOURS/LANDINGS LOGGED SINCE DEPLOYED		3. DAY-HOURS/LANDINGS LOGGED LAST 30 DAYS		
4. INSTRUMENT HRS. LOGGED SINCE DEPLOYMENT		5. NIGHT-HOURS/LANDINGS LOGGED SINCE DEPLOYED		6. NIGHT-HOURS/LANDINGS LOGGED LAST 30 DAYS		

PART II - MAINTENANCE, MATERIAL AND FACILITIES DATA

SECTION F - AIRCRAFT AND ENGINE DATA	DATE OF MANUFACTURE	SERVICE TOUR	MONTHS IN THIS TOUR	TOTAL NO. OF OVER- HAULS	FLIGHT HRS. SINCE LAST OVERHAUL	FLIGHT HRS. SINCE ACCEP- TANCE	TYPE CHECK LAST PERFORMED	FLIGHT HRS. SINCE LAST CHECK	NO. OF DAYS SINCE LAST ACT CHECK
1. AIRCRAFT GENERAL	26 OCT 55	1	13	0.0	0.0	111.7	1st INT.	0.6	0
2. ENGINE HISTORY NO. 1	25 APR 56	J57-P8	P605928	0	0	140.3	1st INT.	0.6	0

c. DID FIRE OCCUR? BEFORE ACCIDENT AFTER ACCIDENT DID NOT OCCUR d. DID EXPLOSION OCCUR IN FLIGHT? YES NO
 e. CHECK IF APPLICABLE f. HAS DIR BEEN REQUESTED
 AMP FUR SERIAL YES NO g. FAILED COMPONENTS INVOLVED
 Starboard elevon latch actuating crank

CHECK BELOW ITEMS PRESENT IN THIS ACCIDENT

- h. AIRCRAFT DESIGN i. UNDETERMINED j. SURFACE FACILITIES
 k. AIRCRAFT EQUIPMENT l. TECHNICAL INSTRUCTION m. HUMAN ENGINEERING
 n. MAINTENANCE o. OTHER, Specify _____

a. ALTITUDE AT
MALFUNCTION b. AIR
SPEED (fts) c. OPERATING
TEMPERATURE
OF AIRCRAFT d. WEIGHT OF
AIRCRAFT e. C.G./MAC f. KIND OF FUEL
Estimated 14,000 ft, 432 fts, 610 °F, 23,667 lb, 24.5% JP-4 g. FUEL
PRESSURE
h. EVIDENCE OF FUEL CONTAMINATION

i. CAUSE OF ENGINE FAILURE OR FLAMEOUT
 None
 j. FUEL CONTROL REGULATOR/CARBURETOR (List Stock and Ser. Nos., give time since last purchased)
 JFC 12-2 S/N 506721PG 86-1 Since overhaul k. EXTERNAL STORES ABOARD A/C
 None
 (if additional space is necessary, attach additional sheet(s))

13

PART II - MAINTENANCE, MATERIAL AND FACILITIES DATA (Cont'd)

- (Open back flap to see section involved in accident)*
- | | | |
|---|--|--|
| a. <input type="checkbox"/> CLEARANCE AUTHORITY | b. <input type="checkbox"/> RUNWAY | c. <input type="checkbox"/> EMERGENCY ARRESTING |
| d. <input type="checkbox"/> FLIGHT PLANNING INFORMATION SOURCE | e. <input type="checkbox"/> WATER LANDING AREA | f. <input type="checkbox"/> GEAR (Runway) |
| g. <input type="checkbox"/> LANDING AIDS (GCA, CCA, ILS, etc.) | h. <input type="checkbox"/> APPROACH ZONE | i. <input type="checkbox"/> AIRCRAFT SERVICING, HANDLING & DIRECTING (Field or Ship) |
| j. <input type="checkbox"/> TRAFFIC CONTROL TOWER (Field or Ship) | k. <input type="checkbox"/> END-ZONE | l. <input type="checkbox"/> CRASH AND RESCUE |
| m. <input type="checkbox"/> APPROACH AND ENROUTE AIDS TO NAVIGATION | n. <input type="checkbox"/> SHOULDER | o. <input type="checkbox"/> SEARCH AND RESCUE |
| p. <input type="checkbox"/> RUNWAY WATCH | q. <input type="checkbox"/> TAXIWAY | r. <input type="checkbox"/> CATAVULT |
| r. <input type="checkbox"/> LANDING SIGNAL OFFICER | s. <input type="checkbox"/> PARKING AREA | t. <input type="checkbox"/> ARRESTING GEAR (Carrier) |
| w. <input type="checkbox"/> OTHER: Specify _____ | | u. <input type="checkbox"/> BARRIER OR BARRICADE (Field or Ship) |
| | | v. <input type="checkbox"/> FLIGHT DECK |

SECTION B - FACILITIES DATA

e. EQUIPMENT INVOLVED:	<input type="checkbox"/> CATAVULT	<input type="checkbox"/> b. PRESSURE SETTINGS	<input type="checkbox"/> c. WIND OVER DECK	<input type="checkbox"/> d. RELATIVE HEADWIND	<input type="checkbox"/> e. APPROACH SPEED SPN-12 READING
f. MARK NUMBER & MODEL NO.					f. LAUNCHING BROLE AND CONFIGURATION USED

J. CATAVULT/ARRESTING GEAR BULLETINS OR NOMOGRAMS USED

IN THIS PORTION SHALL BE COMPLETED WHENEVER (1) A MAJOR AIRCRAFT ACCIDENT INVOLVES ARRESTING GEAR, BARRIER AND/OR BARRICADE EQUIPMENT, OR (2) AN AIRCRAFT ACCIDENT INVOLVES MALFUNCTIONING OF ARRESTING GEAR, BARRIER AND/OR BARRICADE EQUIPMENT. MINOR ACCIDENTS OR ROUTINE DAMAGE TO CABLES, WELDINGS AND OTHER EXPENDABLE COMPONENTS NEED NOT BE REPORTED.

ENGAGED	DECK RUNOUT (FT.)	RAM TRAVEL (IN.)	CONTROL VALVE SETTINGS		ACCUMULATOR PRESSURE (PSI)	COMMENTS (for cable failure specify number of landings and months in service)
			CONSTANT PRESSURE DOME (PSI)	RATIO		
DECK PENDANT						
DECK PENDANT						
BARRIER						
BARRIER						
BARRICADE						

PART SECTION ITEM

PART III - REMARKS (continue on separate pages if necessary)

ADDITIONAL ENCLOSURES

- (12) Photograph of Port Wing outboard section
- (13) Photograph of Starboard Elevon Actuator Bell Crank Assembly
(As found collapsed after accident)
- (14) Photograph of sheared Starboard Elevon latch actuating crank Pin
- (15) Photograph of Damaged Port Elevon latch actuating crank Pin

14

(b) (6)

SIGNATURES (INDICATE) (b) (6)

OPERATIONS

(b) (6)

CDR, USN OFFICER

(b) (6)

LCDR, USN, PROJECT PILOT

(b) (6)

UNIT BILLET

(b) (6)

UNIT BILLET

FLIGHT

(b) (6)

JMF(MC), USNR,

(b) (6)

SURGEON

(b) (6)

UNIT BILLET

(Flight surgeon member)

(b) (6)

(member)

ORIGINAL

PART V The Accident

The aircraft was scheduled as part of an Armed Forces Day flight demonstration being sponsored by this command. This flight was to demonstrate the maximum take-off capability of the aircraft followed by a high speed fly by. The aircraft became airborne on runway 14 in a normal manner at 1307 local time on 14 May 1958 and climbed to approximately 10,000 feet where a reversal was made to line up on runway 32, for a high speed flyby. Approaching the field boundary the pilot lit the afterburner and crossed the field at an estimated 100 ft. altitude and 550 KIAS. Abeam the tower he made a smooth pull up (3 to 3.5 G) to the vertical position and completed two (2) smooth rolls to the left. On the third roll observers noted a rough or jerky roll started which at first appeared to be an eight point roll at which time the pilot transmitted he was experiencing difficulty with his controls. The aircraft ceased its left roll and "scooped" off to the right to very near level flight. At 1310 the pilot transmitted that he had no control as the control stick was frozen in the neutral position. When the aircraft continued a slow right roll the pilot elected to eject and left the aircraft at about 1313, altitude approximately 20,000 feet. The aircraft crashed on the NOTS bombing range at 1315. The pilot landed at 1325 and was recovered with minor injuries.

ORIGINAL

PART VI Damage to Aircraft

F4D-1 BuNo 134762 sustained strike damage. No components are considered salvageable.

Although the pilot experienced a loss of control and abandoned the aircraft in an inverted attitude, there was no in-flight explosion or separation of parts from the airframe prior to ground impact, aside from loss of the ejection seat and canopy, neither of which has been recovered.

The point of impact is 14½ miles NNW of NAF China Lake, in a gently sloping, rocky desert area roughly 2800 feet MSL. From all indications, the attitude at impact was wings level, flat, and at a slow airspeed, quite possibly near the stalling point. The depth of the crater at point of initial impact is no greater than one foot, and the main portion of the fuselage, including the nose section, cockpit, nose wheel assembly, etc., moved forward only a distance of about 5 feet before coming to a halt. Main components, such as wings, empennage, engine, afterburner, main landing gear, pitch trimmers, etc., were scattered along a narrow path some 271 feet in length, with a maximum breadth of about 100 ft. Enclosure (8) is a sketch of the scene, indicating relative distances of various components from the point of initial impact. The wings came to rest on opposite sides of the line of travel of the wreckage, that is the port wing lay to starboard of the center line, and the starboard wing to port. This is in spite of the fact that as well as can be deduced from all other evidence, the aircraft did not strike the ground in an inverted attitude.

The cockpit was completely destroyed by fire. The control stick and some associated parts were recovered, as well as several dials and gauges, most of the latter being unreadable. The accelerometer indicated 4.5 negative G's but the positive G needle was missing. The airspeed indicator was jammed at a reading of 120 K.

There was apparently no explosion on impact.

The engine and afterburner were badly torn and each was broken into several large parts (see enclosure 9). Engine accessories were scattered.

The starboard wing and pitch trimmer were still fairly intact and joined together. The port wing separated at the wing fold, although both in-board and out-board sections were separately intact. All elevon sections remained attached to their respective wing sections. The port pitch trimmer separated from the wing.

The lower section of the rudder separated from the vertical stabilizer, although the upper (servo) rudder remained attached and practically intact.

PART VII The Investigation

I. The investigation of the accident revealed the following facts:

a. LCDR (b) (6) was designated a HTA pilot in 1945 and has since been on continuous active duty involving flying. He has logged a total of 3504.4 hours, of which 604.8 hours were in jet aircraft.

b. LCDR (b) (6) reported to NAF China Lake on 24 September 1956 for duty in a flying status involving operational or training flights.

c. LCDR (b) (6) is considered well above average as a naval aviator.

d. Facts pertaining to the flight on 14 May 1958:

(1) The flight was an authorized and scheduled aerial demonstration.

(2) There was no malfunction of the engine.

(3) Both hydraulic systems were operating normally, with pressures indicating within specified limits.

(4) No malfunction occurred until after the second high speed, vertical roll had been completed.

(5) During the third intended roll, the pilot experienced a "snapping" of the control stick to the neutral or very-slightly to right of neutral position. The aircraft ceased rolling to the left, and at once commenced a very slow roll to right. The pilot states that rudder control was effective at this point, while his speed was high. However, shortly thereafter, by first modulating and then securing the afterburner, he had reduced speed to a point where rudder effect was considerably reduced, and was not sufficient to stop the roll without inducing a vicious yaw. At any rate, the starboard roll continued until the aircraft reached a normal level flight attitude, having "ditched" out of the final portion of the roll. This is the maneuver which appeared to various qualified observers as a "sloppy 8-point roll."

(6) General concensus of witness opinion is that trouble first occurred at about 10,000 feet. 6

(7) The pilot realized he was still in a slow right roll, nose about level, but with considerable nose-up trim on the aircraft. He was unable to stop this roll, and was afraid that when the aircraft reached the inverted position it would enter a high speed dive. He therefore made his decision, which was to eject before the aircraft became inverted.

(8) The pilot reported on voice radio "having serious difficulty", then, "no elevon control - none at all"; later, "I have a little now." This was his last transmission.

(9) The pilot ejected at an altitude estimated by observers as 20,000 ft. in inverted attitude, airspeed unknown, afterburner secured, engine RPM estimated 85%.

(10) Bailout forces were sufficient to part parachute shroud lines 8, 9, 10, and 11.

(11) Time consumed by the parachute descent was approximately twelve minutes.

(12) The pilot experienced several "white-out" periods during his parachute descent, and sustained minor injury on landing.

(13) The pilot removed his oxygen mask, which was held by Hardman suspension fittings, during descent, causing his helmet to bounce from his head on initial ground contact and (b) (6)
(b) (6)

(14) The pilot insists that his control stick was completely immovable in the neutral position. He did not attempt to apply right elevon, but states positively that all his efforts to move the stick left, forward and aft were to no avail.

(15) Pitch trim apparently operated normally, but the lateral (elevon) trim was inoperative.

(16) The aircraft struck in level soft sandy gravel. The impact was at a very low angle, the depth of the hole at the impact point averaged one (1) foot. The aircraft was right side up, wings level and at a low forward speed substantiated by the short distance that major components traveled. The airspeed indicator was jammed at 120 kts IAS, and the accelerometer at negative 4.5 G's.

II. Examination of the wreck revealed the following:

a. The starboard elevon latch actuating link assembly was collapsed in the outboard (wrong) direction, allowing the elevon disconnect latch hook P/N 4436282-7 to disengage from the elevon actuator crank assembly (see enclosure 13). However, the collapse of this unit was such that the latch hook impeded the free movement of the crank assembly when the control system attempted to apply force to the "down" side of the elevon.

b. The port elevon disconnect latch hook was found to be disengaged in the normal manner, presumably as a result of pilot actuation of power control release.

c. Disassembly of the starboard actuator crank assembly disclosed that the elevon latch actuating crank pin P/N 5433462-7 (A, enclosure 13), was sheared in two places, allowing relative motion between the elevon latch actuating torque shaft, P/N 2438206, and the lower elevon latch actuating crank P/N 2438205 (B & C, enclosure 13). The corresponding latch pin from the port elevon crank assembly was bent, and appeared to be on the verge of failure. All crank pin holes on both port and starboard assemblies were slightly elongated. Enclosures (14) and (15) are photographs of the starboard and port crank pins, respectively.

d. Self centering bearings, item 43, figure 112, IPB AN 01-40FBA-4 of both port and starboard crank assemblies were frozen (D, enclosure 13).

e. One gust lock (starboard) was recovered and found to be intact and disengaged.

III. The following pertinent facts were also disclosed:

a. No auto-pilot had ever been installed in BuNo 134762.

b. F4D-1 BuNo 134762 was flown twice on 14 May by LCDR (b) (6). The first flight was normal. The pilot states he performed complete functional checks of the control system prior to both flights, with no evidence of malfunction.

PART VIII The Analysis

Douglas Aircraft Company representatives were invited to lend technical assistance in the investigation. Their aid was invaluable. The entire starboard elevon actuating crank assembly was placed on the F4D flight simulator at the Douglas El Segundo factory and many attempts were made to duplicate the control system reaction as reported by the pilot. These attempts were not completely successful, but it is felt that lack of means of duplicating air loads on the flight simulator was in a large measure responsible.

It is not possible to determine with any degree of certainty the reason for the control stick's abrupt and forceful return to center and "freezing" in that position. However, several possible combinations of circumstances might cause this reaction.

Assuming that the starboard elevon disconnect latch hook was disengaged during flight in the manner in which it was found (see enclosure 13), the combination of sudden airloads on the now manually controlled elevon with the stick not yet extended, the "creeping" of the starboard tandem control cylinder to neutral position and the normal reaction of the port control cylinder through the follow-up system could have exerted sufficient force on the stick to return it to neutral very rapidly.

It was discovered that once the disconnect latch hook was released out-board, it was not completely free of the bell crank assembly, but would nevertheless allow motion of the crank toward the "elevon up" position. The elevon actuator bell crank pin (P/N 5438413-9) could slip by the slightly rounded forward corners of the latch hook, but could not move past the sharper after corners unless almost prohibitive force was applied. Once the crank had moved far enough, therefore, to permit the hook to be positioned forward of the actuator bell crank pin a positive mechanical block was established prohibiting movement of the crank assembly in the "elevon down" direction beyond the near neutral position. Experimentation established that this condition would occur with the elevon actuating cylinder in neutral. The elevons were then "frozen" in a slight right wing down position by a mechanical block on the one side and extreme air loads on the other (airspeed at the time of the failure is estimated at well above 300 kts IAS). Under these conditions, the pilot should have been able to get some right and aft stick movement, but since he was desperately fighting to stop a slow starboard roll, he at no time investigated the starboard side of the stick quadrant. This theory is partially refuted by the pilot's positive conviction that he had no after stick movement available, but again air loads may have accounted for this impression. 9

The jamming of the elevon disconnect hook between the elevon crank assembly and the wing structure is a somewhat more remote, but nevertheless distinct possibility. This could have resulted in a completely immovable control stick.

It is not considered probable that the latch actuating link assembly, having once been tripped in the normal (inboard) direction, could by impact or other loads have been forced through the engaged position and collapsed in the incorrect (outboard) position, shearing the latch actuating crank pin in the process.

The condition of both crank pins and pin holes indicates a gradual deterioration of desired assembly rigidity, probably aggravated by repeated recocking of the disconnect mechanisms by maintenance personnel during routine functional checks, and by resonant vibration in flight.

In point of service BuNo 134762 was one of the oldest F4D's in the Navy, and although its flight time since acceptance is low, it has been subjected to many tests and experiments, first as a prototype test aircraft and later as a Research and Development vehicle. At the same time, hours in flight are believed to be the main factor contributing to crank pin deterioration. It therefore appears that a very real source of danger to service aircraft exists in this area. It is understood that prompt remedial action will be taken by the manufacturer, who is presently conducting a detailed analysis of the sheared starboard crank pin.

The parting of four parachute shroud lines is also considered very serious. If the pilot's estimate of 4 or more seconds between ejection and chute deployment is accurate, the shroud lines should not have been subjected to undue loads. Eyewitness accounts of the pilot's landing substantiate the theory that the parted shroud lines definitely speeded up the rate of descent and made drift control difficult.

The fear of many pilots of being smothered while unconscious after landing by accidental blocking or crimping of the oxygen mask hose poses a problem. Removal of the mask from a helmet equipped with Hardman suspension fittings leaves the helmet unsecured by any means beneath the chin, and therefore easily lost at initial ground impact. Subsequent contacts, especially in rough terrain or under moderate or high wind conditions, would then expose the pilot to probable serious head injury. In the present case, LCDR (b) (6) struck the ground initially with sufficient force to crack the shell of his H-5 helmet. Had he not been protected by his helmet there is a high probability that his skull would have been fractured, perhaps crushed.

ORIGINAL

PART IX Conclusions and Recommendations

The primary cause of this accident was material failure of the starboard elevon latch actuating crank pin, ultimately resulting in elevon seizure.

It is considered that the pilot demonstrated superior airmanship during this emergency. He transmitted to the tower continuously information on the controls freezing and the corrective action he was taking. The ability to upright the aircraft when his controls froze during a vertical climb and the subsequent recovery from it shows cool deliberate thinking. Only after all else had failed did the pilot-elect to eject.

It is recommended that:

- a. The elevon latch actuating assembly be redesigned and retrofitted as soon as possible.
- b. Until such time as a definite fix is available, a regular check along the lines suggested in NAF China Lake 2210-~~Z~~ be accomplished by all commands at intervals no greater than every 30 flight hours. The suggested check for relative motion between the disconnect latch hook and the elevon actuator crank assembly should be added to the regular pre-flight check procedure.
- c. Re-design of the A-13-A oxygen mask and/or the H-5 helmet be undertaken to insure free breathing by an unconscious pilot under all circumstances.

ORIGINAL

PILOT'S STATEMENT concerning crash of F4D-1, Bureau Number 134762

At approximately 1413 PDT on 14 May 1958, I, LCDR (b) (6) was forced to abandon F4D-1, Bureau Number 134762. To the best of my ability the following is a detailed and accurate account of the event. (b) (5)

(b) (5)

[Redacted block]

Prior to take-off, I conducted a complete and functional check of the aircraft, including a visual check of the elevons. The M.A.C. was checked by cranking it to the 3:1 position and observing its automatic return to the take-off and land position.

Take-off was normal. The demonstration maneuver commenced at 10,000' MSL. I dove the aircraft to a relatively low altitude. At the field boundary I lit the afterburner. At the end of runway 32 I commenced a 3 "g" pull-up at 500 to 550 KIAS. Upon reaching the vertical I started rolling to the left at a moderate rate because I did not wish to absorb an excessive amount of climb energy. About two-thirds of the way through the second roll (I normally perform from four to six rolls in this maneuver), the stick jerked violently to neutral. Instinctively I resisted this force but to no avail. Realizing I had control problems I oriented myself to be in an attitude of about 70° nose up slowly rolling to the right. With no back stick available I ran in trim to effect a recovery. Thus with back trim and a built-in right roll I sort of scooped out to level flight. Leading the level flight position I started forward trim because of its slow action. I transmitted my plight to the tower and also the remedial action I was taking. I retarded the throttle first to the fully modulated A.B. position then out of the A. B. detent. The chronological order of the transmissions and throttle movements are vague to me. A glance at the hydraulic gauges showed me that pressure was up in the P. C. and utility systems. I disconnected the P. C. system and extended the stick. It took a second try before the stick remained extended. I noted M. A. C. position at 1:1 and started cranking toward the 2:1 position. I have no recollection of seeing the M. A. C. gauge again. I tried to counteract the right roll with trim before and after stick extension. This failed. With the manual control in, I explored left, forward, and aft stick while fighting a delaying action against the right roll with rudder. When this failed to produce results I again pulled the emergency hydraulic control release and repeated the above operation. I called the tower and told them I thought I had something (not sure of when this call was made). I later found out that it was construed to mean my elevons whereas I meant that I had pitch trimmers and rudders. With the realization that I had only my pitch trimmers and rudders available I decided that when the wings reached the vertical I would leave the airplane. I knew I could not move pitch trimmers fast enough to prevent the nose from falling through necessitating a high "Q" bailout. Reduced rudder effectiveness due to deceleration precluded level flight. I initiated bailout action when the wings were vertical. I pulled the face curtain. A loud bang and a rush of air resulted. "This was easy" I thought. I peeked out from behind the face curtain and was shocked to see the horizon framed by the windshield. I then pulled the face curtain again and ejected in about the inverted position.

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ENCLOSURE ()

I do not wish to be held accountable for the accuracy of the events after the ejection. For what it is worth, the following are my impressions of what occurred after ejection:

I blacked out recovering sans seat, spreadeagled and making many R.P.Ms. With some effort I worked my right arm in and after a bit of groping I found my "D" ring. I had no idea of altitude and what is more, free fall never crossed my mind. Pulling the "D" ring I met no resistance, perhaps due to centrifugal force, resulting from my rotation. The shock of the chute opening amazed me in its intensity. Looking at the canopy I saw a portion of it collapsed and some broken shroud lines. I resolved then and there not to attempt a slip to guide myself not certain whether or not this was wise to do with a partially collapsed chute. After that I comod a long period of time I lapsod into a white out. The bitter end of my oxygen hose was secured by a nylon strap and fastener to my harness, a common practice of mine. Stupidly I had fallen into a bad habit of not snapping in my bailout bottle hose if I didn't propose to go above 20,000 and was not over water. I may have had the white out as a mild form of shock and the bail out bottle may have prevented that. Upon recovering from the white out I disconnected my face mask to facilitate breathing and I feared that if I hit the ground and was unconscious for any reason I might suffocate if the suction created at the bitter end of my oxygen hose caught against an article of clothing. Most every pilot has experienced this. I practiced grunt breathing, and this warded off more white outs for a while. I have no idea how many white outs I experienced but they were numerous. I recovered before I hit the ground. I saw that I was to hit in among lava rocks and concentrated upon staying relaxed. I was rendered unconscious upon impacting the rocks. The observers in the helicopter, on hand can relate more accurately what occurred from the second I impacted the ground.

(b) (6)

ORIGINAL

EYE WITNESS'S STATEMENT OF F4D-1 BUNO 134762 CRASH

During rehearsal for Armed Forces day I was standing in front of Hangar #1 watching the aircraft. I saw LCDR (b) (6) take off in the F4D in a low pass up runway #32, executing a steep climb out. At the top of the climb the aircraft appeared to make a partial vertical roll and the nose appeared to fall through to approximately level flight. At this point I lost sight of the aircraft. I then learned that someone had ejected on the north end of the range and LTJG (b) (6) from VX-5 and I attempted to spot the pilot and aircraft. LTJG (b) (6) saw the F4D just prior to its striking the ground and I saw it at the instant of impact. All I could see was an instantaneous ball of fire when the aircraft hit and then smoke. I then located the pilot and watched until he landed.

I have been a designated Naval Aviator since February 1954 and have approximately 1400 hours of flight time. I am qualified in both VF prop and jet with most time in reciprocating engine type aircraft.

(b) (6)

(b) (6)

Lieutenant, USN

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ENCLOSURE (2)

ORIGINAL

OBSERVER'S STATEMENT Concerning crash of F4D-1 Bureau 134762

During a demonstration maneuver the F4D passed by the tower (position of the observer) at approximately 550 KTS (IAS) and commenced a 3 to 4 "g" pull up. When vertical the pilot made two coordinated rolls at which time the A/C seemed to jerked in a continued roll, which appeared to be an eight point roll. The F4D then scooped out in level flight and began to roll to the right. A few seconds elapsed when the pilot bailed out.

I am a Naval Aviator with 5600 hours Navy flight time, 1500 hours of Jet time and 2300 hours civilian flight time. I am an Aeronautical Engineer with graduate work in Aerodynamics.

(b) (6)

- (U) (U)
LCDR., USNR

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ENCLOSURE (3)

ORIGINAL

At approximately 1h00, 14 May 1958, I was standing about 50 feet in front of hangar #1 on the Naval Air Facility, China Lake, California observing the "high performance" takeoff of an F4D Skyray. After take-off on runway 14 the aircraft made a 90-270 degree turn and proceeded to come back by the hangar, passing over runway 32. The F4D began a pullup in front of hangar #2 to an approximate vertical position at about 2000 feet (above the surface) in front of hangar #1. At this time the aircraft appeared to begin an 8 point vertical roll. After the first three or four points the aircraft went into a barrel roll type maneuver, pulling out on a northerly heading, right wing low, slightly nose high. I watched the aircraft for approximately 30 seconds at which time I turned to walk away. Almost immediately the crash alarm went off and I returned to my original position. I began looking for the F4D--I saw the parachute of the pilot first, and then, as the sun struck the rotating white wings, I observed the aircraft approximately half way between the parachute and the ground. The aircraft appeared to be in a flat spin. I would estimate the attitude to have been no more than 30 to 40 degrees nose low. The F4D appeared to strike the ground about 10 miles north of Charlie Tower, but west of the north C-3 range line. The helicopter and fire equipment were dispatched immediately, at which time I went inside the hangar.

I have approximately 600 flight hours, 300 of these being jet hours.
I also have four years experience as a control tower operator.

(b) (6)

(b) (6)
LTJG USNR
Air Development Squadron FIVE

ORIGINAL

U. S. NAVAL AIR FACILITY
China Lake, California

26 May 1958

From: Maintenance Officer, U. S. Naval Air Facility
 To: Aircraft Accident Investigation Board

Subj: Engineering Report on F4D-1 BuNo 134762

1. Subject aircraft was accepted by the Navy from Douglas Aircraft Company on 25 October 1956. It was accepted by NAF China Lake from P & D RFB-EI Segundo on 31 July 1957. At the time of the accident it had accumulated 13 operating months in its first service-tour, and had a total of 112 flight hours since acceptance.

2. A first intermediate maintenance inspection was performed on 14 May 1958 and a test flight of .3 hours duration was flown with no discrepancies noted on the yellow sheet.

3. Following is status of aircraft service changes relative to elevon control:

NO	STATUS	CATEGORY	REMARKS
ASC 30	Not Inc.	Routine action	Scheduled for PDM by contractor
ASC 36	Not Inc.	Routine action	Scheduled for PDM by contractor
ASC 43	Not Inc.	Urgent action	
ASC 67	Inc. by NAF China Lake 10/20/57	Urgent action	
ASC 103	Not Inc.	Routine action	
ASC 104	Marked 'NED' in log book	Urgent	Listed as 'To be modified by contractor prior to delivery'. Contract No. 52-977

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4. On 24 September 1958 the port elevon actuator DAG P/N 534804-1 was changed. There is no history of any parts replacement in the starboard elevon control system.

(b) (6)

ENCLOSURE (5)

U.S. NAVAL AIR FACILITY
CHINA LAKE, CALIFORNIA

ORIGINAL

CRASH REPORT

TIME OF CRASH 1319 PST

DATE OF CRASH 14 May 1958

Location of crash in respect to Armitage Field North of Station

Type of A/C involved F4D-1 Bureau Number of A/S 134762

LOCAL WEATHER OBSERVATION RECORDED IMMEDIATELY AFTER WARNING SIREN SOUNDED:

Ceiling Unlimited State of Sky 8,000' Scattered

Visibility Unrestricted Weather and obstructions to Vision if any None

Temperature 83 °F. Dew Point 31 °F. Wet Bulb 56 °F

Relative Humidity 15 % Station Pressure 27.675 inches

Altimeter Setting 30.00 inches

Surface Wind Direction 090° Velocity 6 knots

Cloud Types, Amounts and Heights

1/10 Cumulus Base 8,000 feet

Remarks CAVU

(b) (6)

(b) (6)

AGC ✓
Observer's Name Rate

(b) (6)

(b) (6) LTJC OSNR
WEATHER SERVICE OFFICER

ORIGINAL

SURVIVAL OFFICER'S STATEMENT

The pilot states that after pulling the face curtain there was a time laps of undetermined duration. His first recollection was of tumbling spread eagle and being unable to reach the rip cord. This was due to the centrifugal force holding his arms and legs at length. He finally inched his right hand in and pulled the rip cord.

While descending in the parachute the pilot could see no tears in the parachute but that some shroud lines were parted. Later investigation disclosed that shroud lines 8, 9, 10, and 11 were parted.

The parachute was cut up at the scene to aquire shade for the unconscious pilot. Later examination failed to establish which gores or panels might have been damaged by the opening shock.

The ejection seat mechanism and lab belt cartridge functioned properly.

The seat had parted from the pilot when he became aware of being clear of the aircraft.

The pilot states that he pulled the face curtain while level and approximately at a 60° right bank. When the curtain travel stopped and the pilot heard the lowd noise of air rushing around him he presumed he was clear of the aircraft. After a few seconds he peeked from under the curtain and found he was still in the aircraft. At this time the aircraft was approaching the inverted position. The pilot pulled the curtain again to the second detent and ejected normally. His comment was that he had not pulled the face curtain the required amount.

(b) (6)

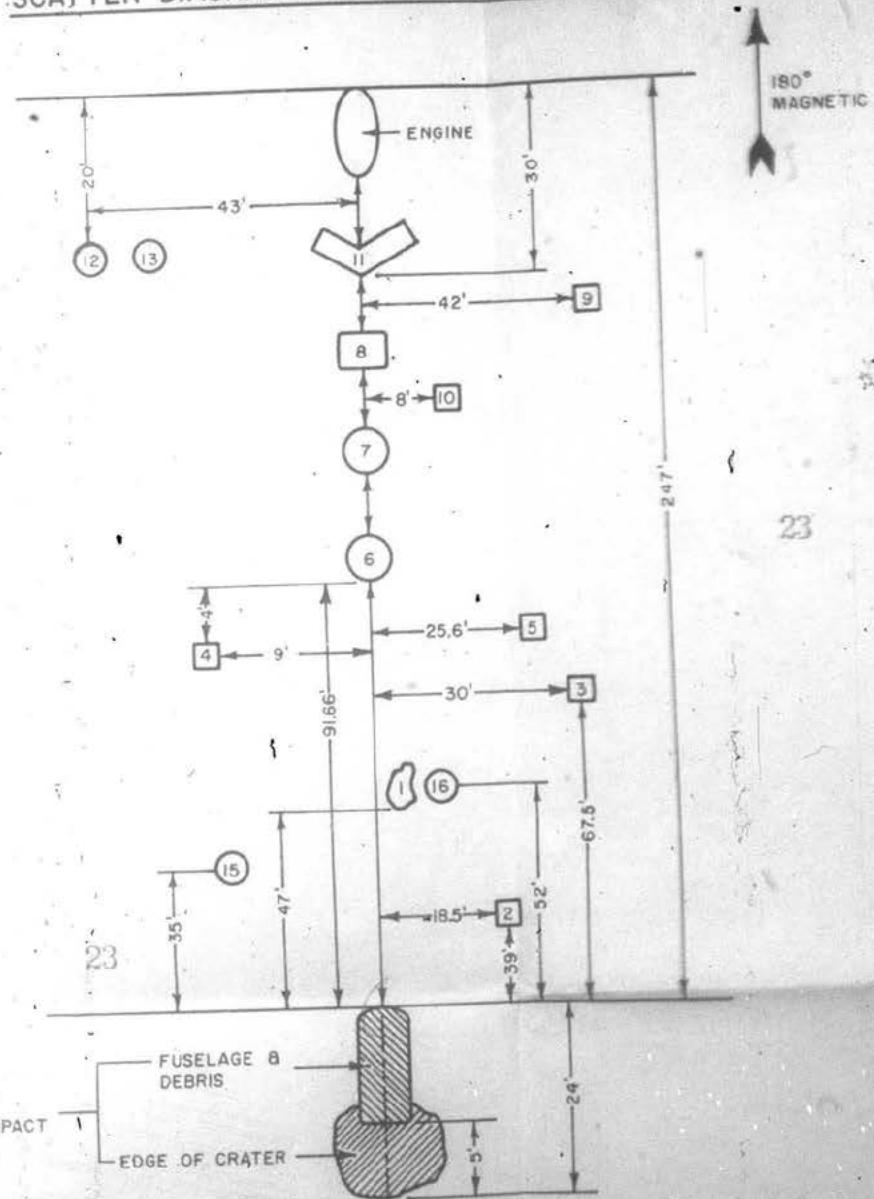
(b) (6)

LCDR, USN
Survival Officer

ENCLOSURE (7)

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SCATTER DIAGRAM FOR F4D-I BUNO 134762



POINT OF
INITIAL IMPACT

EDGE OF CRATER

WD SECT. AFTER BURNER
ENTER SECT. PORT. WING
OUTBOARD SECT. PORT. WING
TORN LOOSE AT WING FOLD
STARBOARD WING & PITCH TRIMMER
PORT. PITCH TRIMMER
PT. SECT. A/B. SHELL
/B INNER DUCT SHROUD
/B ASSEMBLY
FUSELAGE RAZOR BACK (CONTAINS FUEL
LINE VALVE ACCESS)

(10) MANUAL RUDDER
(11) MAIN VERTICAL STABILIZER AND SERVO
RUDDER SECT.
(12) NI COMPRESSOR HOUSING (CONTAINS H2
COMPRESSOR TO 4TH MAIN BEARING)
(13) NI COMPRESSOR (PART)
(14) NI COMPRESSOR (PART)
NOTE: THREE STAGES OF NI COMPRESSOR
CONTINUED FOR APPROXIMATELY
400 YARDS ACROSS TERRAIN
(15) PORT LANDING GEAR STRUT



ENCLOSURE (9)



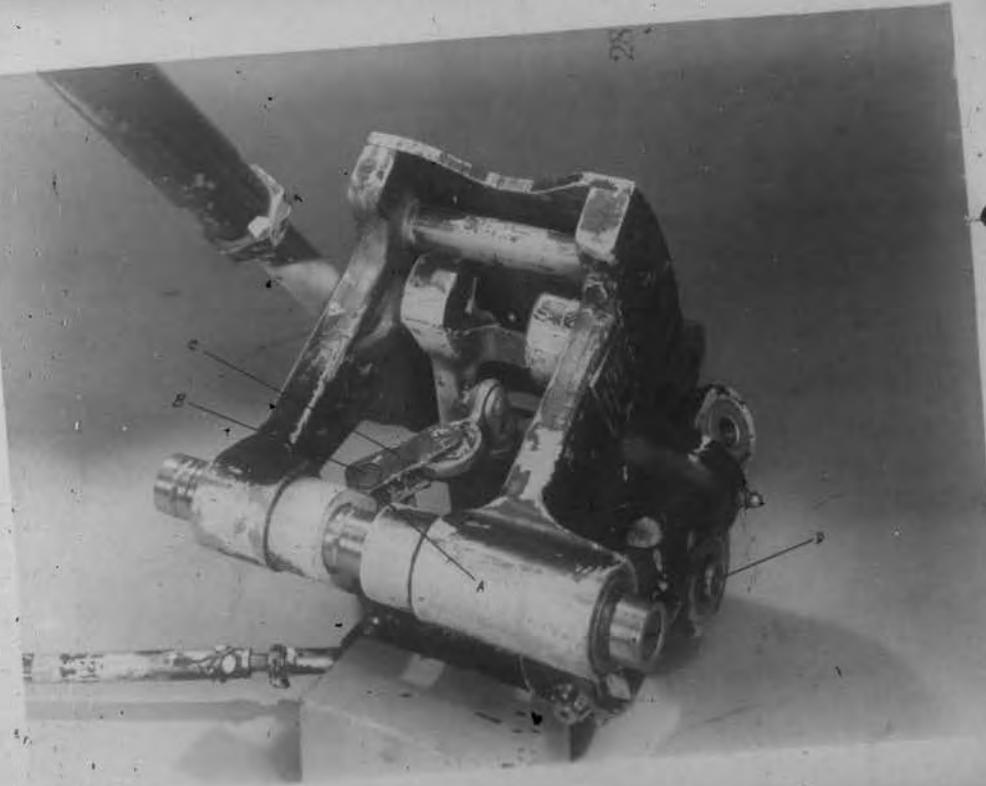


ENCLOSURE //

8 05 14 1 02



ENCLOSURE (13)



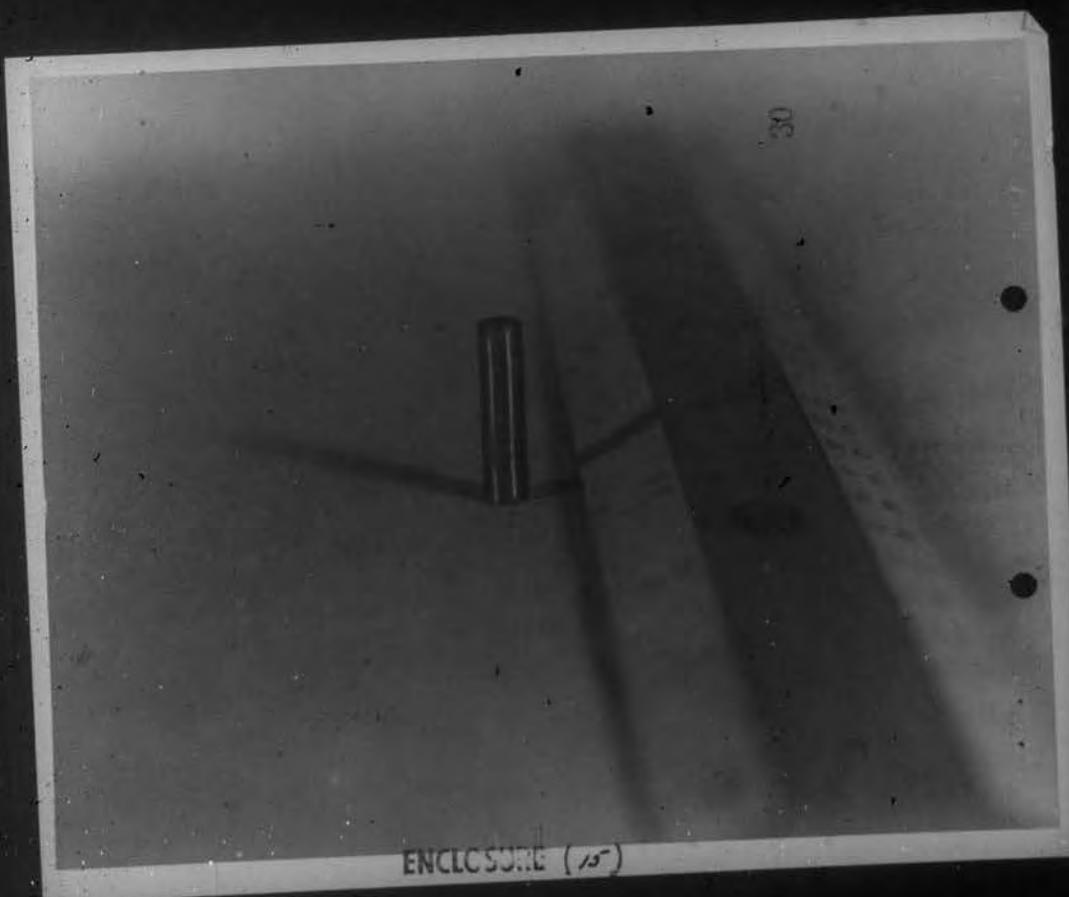
ES 172795 DOUGLAS
FDD-1 1210 5/19/58
ELEVON ACTUATING CRANK ASSY. (SUNO 134762)

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ENCLOSURE (1*)

8 05 14 1 02



ENCLOSURE (10)